

# **Pilot Green Transport Fund**

## **Final Report On Trial of Hybrid Medium Goods Vehicle for Landscaping & Horticultural Maintenance Service (Yee Sun Garden Limited)**

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The Monitoring and Evaluation Team's views expressed in this report do not necessarily reflect the views of the Environmental Protection Department, HKSAR.

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**Pilot Green Transport Fund  
Trial of Hybrid Medium Goods Vehicle  
for Landscaping & Horticultural Maintenance Service  
(Yee Sun Garden Limited)**

**Final Report  
(Trial Period: 1 August 2018 — 31 July 2020)**

## **Executive Summary**

### **1 Introduction**

1.1 The Pilot Green Transport Fund (the Fund) is set up to encourage transport operators to try out green innovative transport technologies, contributing to better air quality and public health for Hong Kong. Yee Sun Garden Limited (Yee Sun) was approved under the Fund for trial of one hybrid medium goods vehicle for landscaping and horticultural maintenance service. Through the tendering procedures stipulated in the Subsidy Agreement, Yee Sun procured one Hino 300 series diesel-electric hybrid medium goods vehicle (HV) for trial.

1.2 The Hong Kong Institute of Vocational Education (Tsing Yi) has been engaged by the Environmental Protection Department as an independent third-party assessor to monitor the trial and evaluate the performance of the trial vehicle. Yee Sun assigned a Mitsubishi Fuso diesel medium goods vehicle (DV) providing the same type of service for comparing with the HV.

1.3 This Final Report summarizes the performance of the HV in the 24 months of the trial as compared with its conventional counterpart.

### **2. Trial and Conventional Vehicles**

2.1 The HV had a gross vehicle weight (GVW) of 8,500 kg and a cylinder capacity of 4,009 cc, while the DV had a GVW of 9,000 kg and a cylinder capacity of 2,998 cc. Both vehicles were used for landscaping and horticultural maintenance service.

2.2 Key features of the HV and DV are presented in Appendix 1 and photos of the vehicles are in Appendix 2.

### **3 Trial Information**

3.1 The trial started on 1 August 2018 and lasted for 24 months. Yee Sun was required to collect and provide trial information including the HV odometer reading at refueling, the date of refueling, the refueled amount, cost and operation downtime associated with scheduled and unscheduled maintenances of the HV. Similar set of monthly data of the DV was also required. In addition to the cost information, reports on maintenance work, operational difficulties and opinions of the drivers and Yee Sun were also collected to reflect any problems of the HV.

## 4 Findings of Trial

4.1 Table 1 summarizes the operational statistical data of the HV and the DV. The average fuel cost of the HV was HK\$1.18/km (27%) lower than that of the DV. The average total operating cost of the HV was HK\$0.69/km (14%) lower than that of the DV.

Table 1: Key operation statistics of each vehicle (August 2018 – July 2020)

	<b>HV</b>	<b>DV</b>
Total mileage (km)	11,751	25,754
Average fuel economy (km/litre)	4.50	3.28
Average fuel cost (HK\$/km) <sup>[1]</sup>	3.13	4.31
Average total operating cost (HK\$/km)	4.34	5.03
Downtime (working day) <sup>[2] [3]</sup>	4	8

[1] The market fuel price was used for calculation.

[2] Downtime refers to the equivalent number of working days in which the vehicle is not in operation due to maintenance, counting from the first day it stops operation till the day it is returned to the operator.

[3] Maintenance due to incidents unrelated to the performance of the vehicle was not included for comparison.

4.2 There were 2 scheduled maintenances for the HV and 3 scheduled maintenances for the DV in this reporting period, leading to 4 days and 8 days of operational downtime for the HV and the DV respectively. There were 593 working days in the trial period. The utilization rates of the HV and the DV were both 99%.

4.3 Yee Sun had no designated driver for the HV. According to the drivers' feedback to the questionnaires, the drivers expressed that the HV had comparatively lower power when driving uphill and sometimes even on plain road. Also, its start-up response was comparatively slower. Therefore, they like driving the DV more than the HV.

4.4 Yee Sun was satisfied with the HV's performance. Yee Sun claimed the HV could help improve the roadside air quality, therefore they would encourage other transport operators to try out this type of vehicle.

4.5 To eliminate the effect of seasonal fluctuations, 12-month moving averages were used to evaluate the trend of the HV fuel economy. It was shown that the HV fuel economy was stable (varied between 4.49 km/litre and 5.64 km/litre). There was no indication in the deterioration of the batteries of the HV over the trial period.

4.6 Based on the total mileage of the HV in the 24 months of the trial, the carbon dioxide equivalent (CO<sub>2</sub>e) emission from the HV was 6,892 kg while that from the DV was 9,456 kg. Hence, the CO<sub>2</sub>e emission of the HV was 2,564 kg (27%) lower than that of the DV in the trial.

## 5 Summary

5.1 According to the drivers' feedback to the questionnaires, the drivers expressed that the HV had comparatively lower power when driving uphill and sometimes even on plain road. Also, its start-up response was comparatively slower. However, Yee Sun was satisfied with the HV's performance. Yee Sun claimed the HV could help improve the roadside air quality, therefore they would encourage other transport operators to try out this type of vehicle.

5.2 The utilization rates of the HV and the DV were both 99%. However, the usage of the HV was on the low side as reflected by the difference in the total mileage travelled between the HV (11,751 km, i.e. 20 km on average per working day) and the DV (25,754 km, i.e. 44 km on average per working day) in the 24 months of trial.

5.3 The average fuel cost of the HV was HK\$1.18/km (27%) lower than that of the DV, and the average total operating cost of the HV was HK\$0.69/km (14%) lower than that of the DV. Compared with the DV, the economic advantage of the HV was obvious. Also, the HV had about 27% CO<sub>2</sub>e emission lower than the DV.

5.4 No deterioration in the performance of the HV was observed during the trial period.

## **Appendix 1: Key Features of Vehicles**

### **1. Trial HV**

<b>Registration Mark</b>	<b>VA8982</b>
Make:	Hino
Model:	300 SERIES HYBRID XKU730R-HKUTS3
Class:	Medium Goods Vehicle
Gross vehicle weight:	8,500 kg
Seating capacity:	Driver + 2 passengers
Engine capacity:	4,009 c.c.
Maximum Output (ps/rpm):	150/2,500
Battery Type:	Nickel-Metal Hydride Battery
Year of manufacture:	2017

### **2. DV for comparison**

<b>Registration Mark</b>	<b>SE1493</b>
Make:	Mitsubishi Fuso
Model:	FEC91GR3SDAD
Class:	Medium Goods Vehicle
Gross vehicle weight:	9,000 kg
Seating capacity:	Driver + 2 passengers
Engine capacity:	2,998 c.c.
Year of manufacture:	2012

## Appendix 2: Photos of Vehicles

### 1. Trial HV



Front view of HV



Rear view of HV



Left side view of HV



Right side view of HV

## 2. DV for comparison



Front view of DV



Rear view of DV



Left side view of DV



Right side view of DV